

Part 1 - Pending Claims in Clean Form

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1. (Original) A varactor comprising:  
a diode junction;  
a depletion region adjacent to the diode junction; and  
a doped region including the depletion region and having a  
nonuniform dopant concentration profile that increases with increasing depth of the  
doped region from the diode junction;  
and wherein the nonuniform dopant concentration profile causes the  
varactor to have an approximately linear capacitance/voltage response  
characteristic.
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2. (Original) A varactor as defined in claim 1 wherein:  
the doped region includes a peak dopant concentration region  
outside the depletion region; and  
the peak dopant concentration region forms a conductive path to and  
from the varactor.
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3. (Amended) A varactor as defined in claim 1 wherein:  
the nonuniform dopant concentration profile is defined by an  
equation  $N = Bx \exp(m)$ , where  $N$  is the dopant concentration,  $x$  is the depth of the  
doped region,  $B$  is a concentration constant and  $m$  is an exponent that determines  
the degree of curvature of the dopant profile.
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4. (Original) A varactor as defined in claim 3 wherein  $m$  is greater than  
zero.
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6. (Original) A varactor as defined in claim 3 wherein:  
 $B$  is in a range from about  $1.0E13/cm^3$  to about  $1.0E19/cm^3$ ; and  
 $m$  is greater than zero.
7. (Original) A varactor as defined in claim 6 wherein  $B$  is about  
 $1.0E16/cm^3$ .

8. (Amended) A varactor for use in an integrated circuit comprising:  
a semiconductor substrate;  
a first side of the varactor formed in the semiconductor substrate and  
being doped with a first type of dopant in a retrograde dopant profile;  
a second side of the varactor formed in the semiconductor substrate  
adjacent the first side and being doped with a second type of dopant; and  
a portion of the first side adjacent the second side forming a  
depletion region within the first side upon applying a voltage bias between the first  
side and second side, the dopant profile in the first side creating a capacitance  
10 between the first side and the second side that is linearly variable in response to  
differing magnitudes of the applied voltage bias.

9. (Original) A varactor as defined in claim 8 wherein:  
the retrograde profile of the first type of dopant in the first side  
includes an increasing dopant concentration with increasing depth from the  
second side to a peak concentration region; and  
5 the peak concentration region functions as a conductive path to and  
from the varactor.

10. (Original) A varactor as defined in claim 8 wherein:  
the first side is a generally horizontal bottom side; and  
the second side is a top side generally parallel to the bottom side.

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Part 2 – Pending Claims with Markings and Indications to Show Changes

1. (Original) A varactor comprising:
  - a diode junction;
  - a depletion region adjacent to the diode junction; and
  - a doped region including the depletion region and having a
- 5 nonuniform dopant concentration profile that increases with increasing depth of the doped region from the diode junction;
  - and wherein the nonuniform dopant concentration profile causes the varactor to have an approximately linear capacitance/voltage response characteristic.
2. (Original) A varactor as defined in claim 1 wherein:
  - the doped region includes a peak dopant concentration region outside the depletion region; and
  - the peak dopant concentration region forms a conductive path to and
- 5 from the varactor.
3. (Amended) A varactor as defined in claim 1 wherein:
  - the nonuniform dopant concentration profile is defined by an equation  ~~$N=Bxm$~~   $N=Bx\exp(m)$ , where N is the dopant concentration, x is the depth of the doped region, B is a concentration constant and m is an exponent that
- 5 determines the degree of curvature of the dopant profile.
4. (Original) A varactor as defined in claim 3 wherein m is greater than zero.
5. (Original) A varactor as defined in claim 3 wherein m is about 3.
6. (Original) A varactor as defined in claim 3 wherein:
  - B is in a range from about  $1.0E13/cm^3$  to about  $1.0E19/cm^3$ ; and
  - m is greater than zero.
7. (Original) A varactor as defined in claim 6 wherein B is about  $1.0E16/cm^3$ .

8. (Amended) A varactor for use in an integrated circuit comprising:  
a semiconductor substrate;  
a first side of the varactor formed in the semiconductor substrate and  
being doped with a first type of dopant in a retrograde dopant profile;  
5 a second side of the varactor formed in the semiconductor substrate  
adjacent the first side and being doped with a second type of dopant; and  
a ~~depletion region formed within~~ portion of the first side adjacent the  
second side forming a depletion region within the first side upon applying a voltage  
bias between the first side and second side, ~~the voltage bias also dopant profile in~~  
10 the first side creating causing a capacitance between the first side and the second  
side that is linearly variable with in response to differing magnitudes of the applied  
voltage bias.
9. (Original) A varactor as defined in claim 8 wherein:  
the retrograde profile of the first type of dopant in the first side  
includes an increasing dopant concentration with increasing depth from the  
second side to a peak concentration region; and  
5 the peak concentration region functions as a conductive path to and  
from the varactor.
10. (Original) A varactor as defined in claim 8 wherein:  
the first side is a generally horizontal bottom side; and  
the second side is a top side generally parallel to the bottom side.